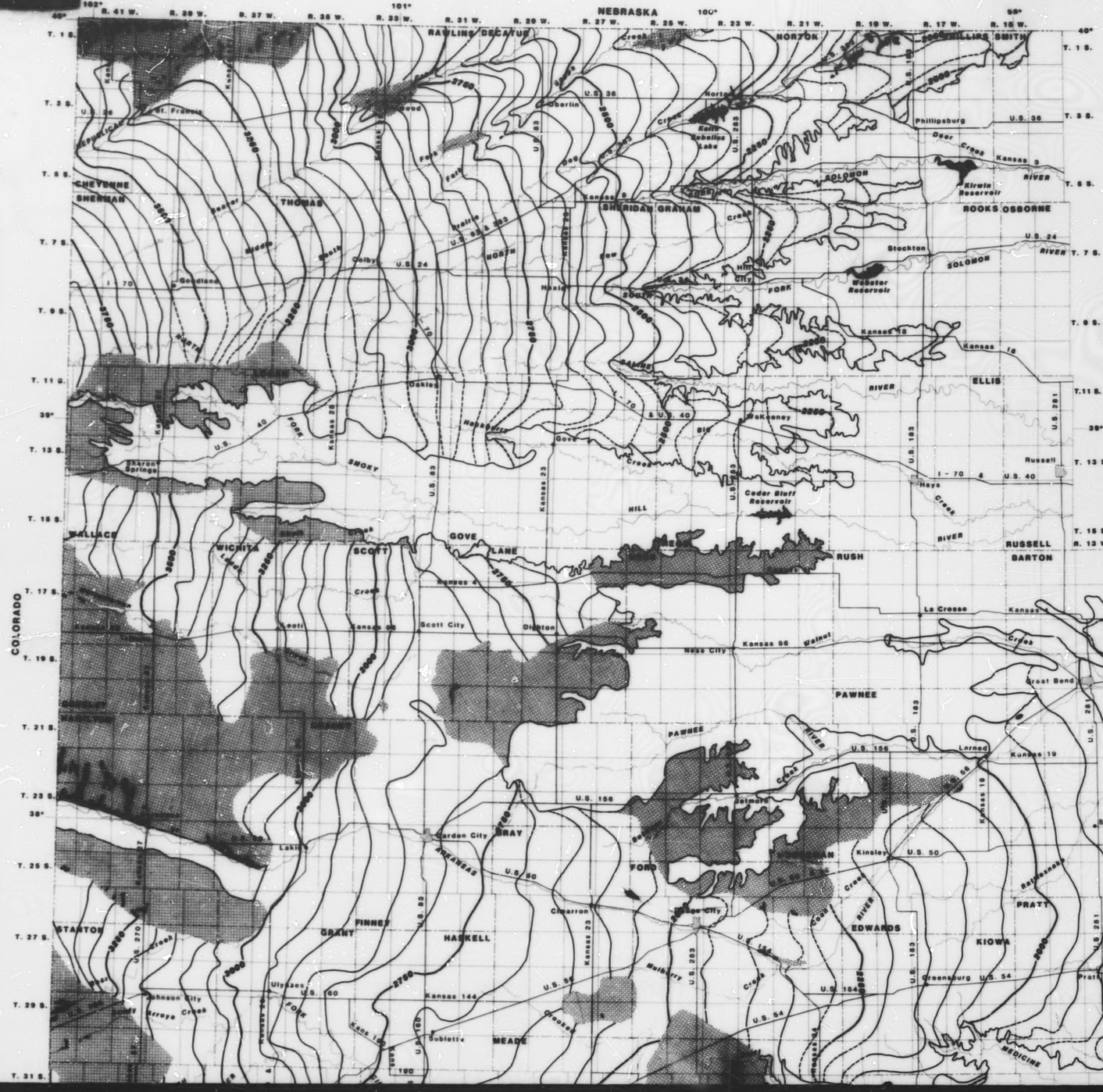
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



GENERAL DESCRIPTION

The High Plains aquifer in Kansas is part of a regional aquifer system that extends into Colorado, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer in Kansas underlies 21,000 square miles in the western and south-central part of the State. The aquifer is a hydraulically connected assemblage of unconsolidated water-bearing deposits. In western Kansas, the High Plains aquifer consists principally of the Ogallala Formation of late Tertiary age and overlying deposits of Quaternary age. In south-central Kansas, the aquifer consists of unconsolidated deposits principally of Quaternary age. Valley alluvium of Quaternary age also is included in the deposits in both areas. The High Plains aquifer is delimited on the east by outcrops of Permian or Cretaceous rocks and by unsaturated deposits of Quaternary age.

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide: (1) Hydrologic information for evaluating the effects of continued ground-water development and (2) data for development of computer models to predict aquifer response to changes in ground-water development. The plan of study for the High Plains Regional Aquifer System Analysis is described by Weeks (1978). This report is one of a series that presents hydrologic information on the aquifer in Kansas for a specified time.

The altitude and configuration of the water table during 1985 are shown for the High Plains aquifer in Kansas. Data used in preparing the maps included: (1) Water levels measured by the U.S. Geological Survey, as part of a continuing cooperative project with the Kansas Geological Survey and the Kansas State Board of Agriculture, Division of Water Resources; (2) water-level measurements published in county reports by the Kansas Geological Survey; and (3) water levels reported by private drilling contractors. In irrigated areas, measurements were made during the winter when water levels generally had recovered from withdrawals during the previous irrigation season.

The water table sloped generally from west to east at an average rate of 10 feet per mile. The altitude of the water table ranged from about 3,000 feet in the southwest corner of Sherman County, northwestern Kansas, to about 1,300 feet in northern Sedgwick County, south-central Kansas. Ground water moved perpendicular to the water-table contours from higher altitudes in the western part of the High Plains to lower altitudes to the east. Contours that crossed stream valleys without flexure may indicate that the water table was below the stream-bed. Upgradient flexure of water-table contours along streams indicates that ground water flowed toward, and discharged into, streams. This is most evident along the South Fork Republican River in Cheyenne County, northwestern Kansas, and the South Fork Ninnescah River in Pratt and Kingman Counties, south-central Kansas.

Three levels of contour reliability were recognized based on density of data available for this compilation. Contours identified as type 1 are considered to be well-controlled by data and accurately represent water levels within ± 25 feet of altitude (one-half contour interval). Type-1 contours generally coincide with areas of known ground-water irrigation potential. Contours identified as type 2 are based on a data-point density of less than one point per township, and the accuracy is somewhat decreased. Contours identified as type 3 were interpreted from various indirect sources, and the accuracy is considered to be speculative. Areas that show type-3 contours are predominantly "fringe areas" of the aquifer system that have relatively little saturated thickness or irrigation development. Altitude and configuration of land surface and bedrock, interpretations from previous reports, and water-level measurements dated other than that of the map were used to control type-3 contours. In areas where the water table is at or near the bedrock surface, contouring was not practical.

CONVERSION TABLE

The inch-pound units of measurement given in this report are listed with equivalent International System (SI) of Units, using the following conversion factors:

Inch-pound unit	Multiply by	SI unit
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
foot per mile	0.1894	meter per kilometer

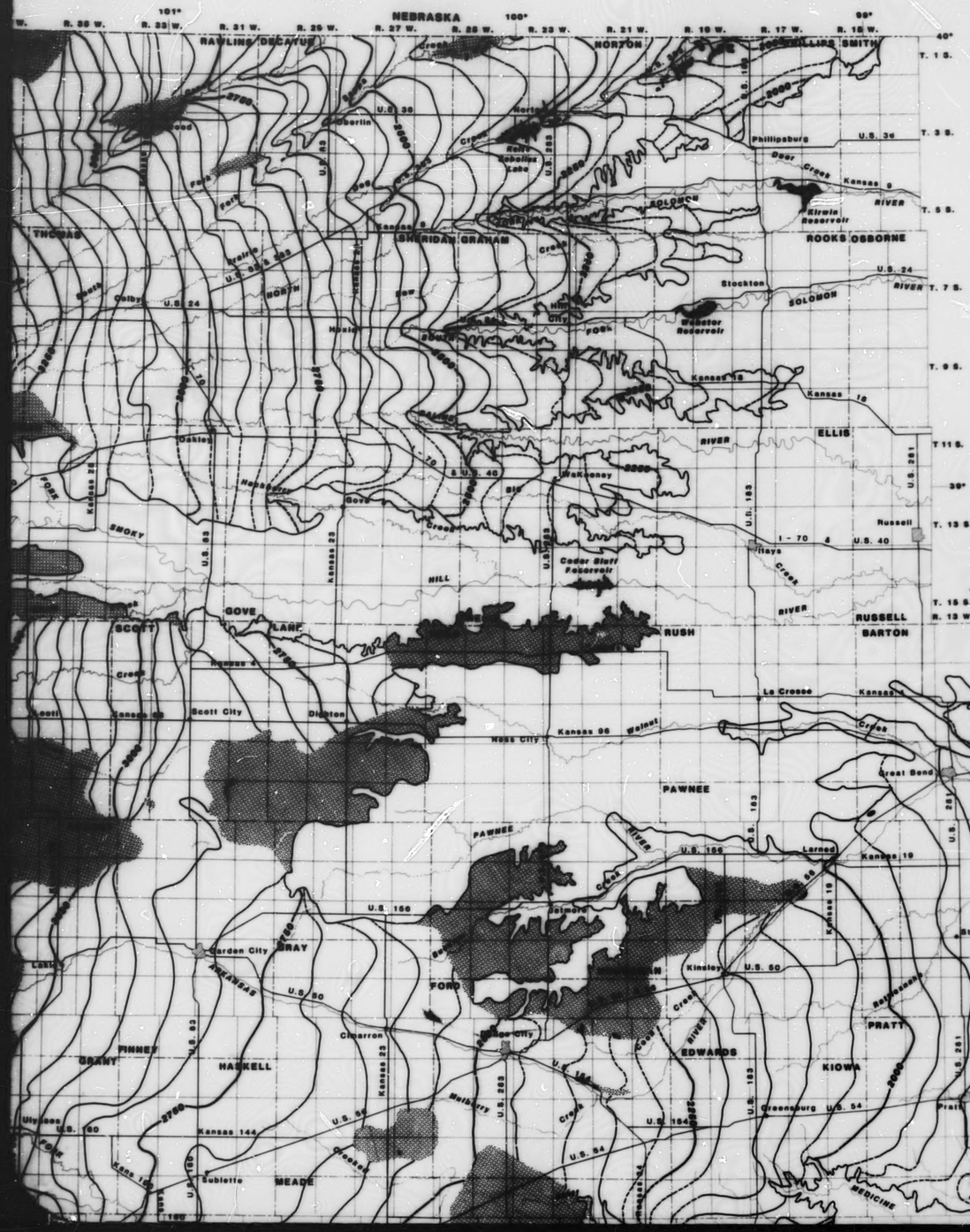
SELECTED REFERENCES

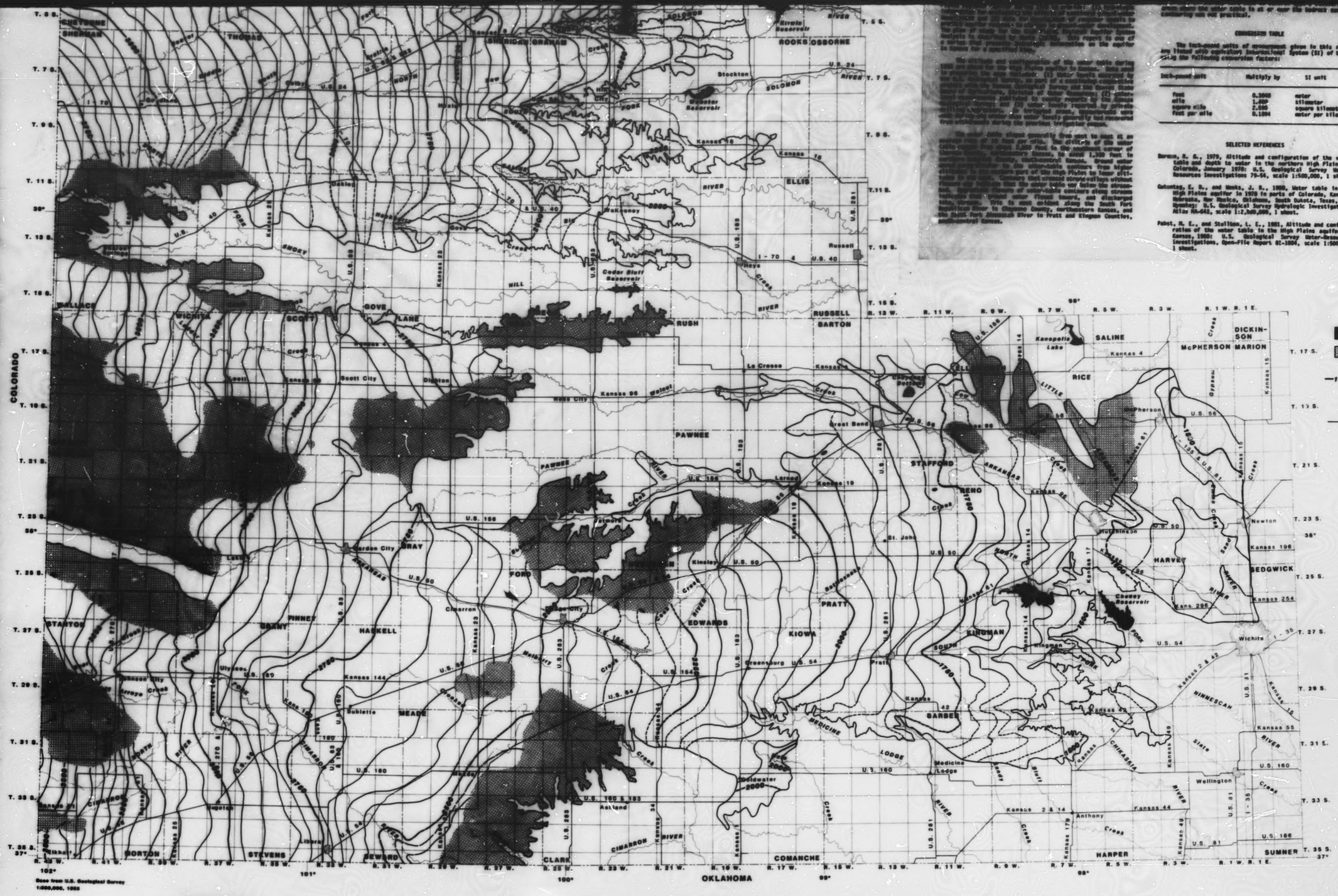
Bowman, D. G., 1979, Altitude and configuration of the water table and depth to water in the northern High Plains of Colorado, January 1978: U.S. Geological Survey Water-Resources Investigations 79-54, scale 1:500,000, 1 sheet.

Gutentag, E. D., and Weeks, J. B., 1980, Water table in the High Plains aquifer in 1978 in parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming: U.S. Geological Survey Hydrologic Investigations Atlas HA-642, scale 1:2,500,000, 1 sheet.

Pabst, M. E., and Stullken, L. E., 1981, Altitude and configuration of the water table in the High Plains aquifer in Kansas, 1980: U.S. Geological Survey Water-Resources Investigations, Open-File Report 81-1004, scale 1:500,000 1 sheet.

DRAWING NUMBER


NEBRASKA
101°
100°
99°
40°
39°
38°
R. 30 W.
R. 33 W.
R. 31 W.
R. 29 W.
R. 27 W.
R. 25 W.
R. 23 W.
R. 21 W.
R. 19 W.
R. 17 W.
R. 15 W.
T. 1 S.
T. 3 S.
T. 5 S.
T. 7 S.
T. 9 S.
T 11 S.
T. 13 S.
T. 15 S.
T. 17 S.
T. 19 S.
T. 21 S.
T. 23 S.
T. 25 S.
T. 27 S.
T. 29 S.
T. 31 S.
RAWLINS
DECATUR
NORTON
PHILLIPS
SMITH
JEWELL
REPUBLIC
WASHINGTON
CLAY
CLOUD
OTTAWA
THOMAS
SHERIDAN
GRAHAM
ROOKS
OSBORNE
MITCHELL
LINCOLN
ELLSWORTH
SALINE
OTTAWA
DICKINSON
MARION
SHERMAN
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSSELL
BARTON
RUSH
OLIVE
RICE
MCPHERSON
SCOTT
LANE
NESS
PAWNEE
STAFFORD
RENO
HARVEY
SEDGWICK
HAMILTON
KEARNY
FINNEY
HODGEMAN
PRATT
KINGMAN
HASKELL
GRAY
FORD
EDWARDS
KIOWA
BARBER
MEADE
CLARK
COMANCHE
Oberlin
Norton
Phillipsburg
Colby
Hoxie
Stockton
Webster Reservoir
Kirwin Reservoir
Oakley
Hays
Russell
Cedar Bluff Reservoir
Scott City
Dighton
Ness City
Great Bend
Larned
Garden City
Kinsley
Dodge City
Cimarron
Ulysses
Sublette
Liberal
Kanopolis Lake
Salina
McPherson
Hutchinson
Newton
Cheney Reservoir
Wichita
Greensburg
Pratt
Kingman
Medicine Lodge
Arkansas City
Winfield
Kansas 9
Kansas 18
Kansas 4
Kansas 96
Kansas 19
Kansas 156
Kansas 144
Kansas 42
Kansas 254
Kansas 196
Kansas 15
Kansas 55
U.S. 36
U.S. 24
U.S. 40
U.S. 83
U.S. 183
U.S. 281
U.S. 56
U.S. 50
U.S. 54
U.S. 81
U.S. 160
U.S. 400
I - 70
I - 135
I - 35
Republican River
Solomon River
Smoky Hill River
Saline River
Arkansas River
Ninnescah River
Cimarron River
Medicine Lodge River
Walnut Creek
Pawnee River
Big Bend
Cheyenne Bottoms
Quivira
Gypsum Creek
Sand Creek
Chikaskia River
Bluff Creek
Buckner Creek
Bluff Creek
Crooked Creek
Sawlog Creek
Bow Creek
Cow Creek
Rattlesnake



Base from U.S. Geological Survey
1:1,000,000, 1960

ALTITUDE AND CONFIGURATION OF THE WATER TABLE IN THE HIGH PLAINS AQUIFER IN KANSAS, 1965

By

M.E. Pabst and L.E. Stullken

1982

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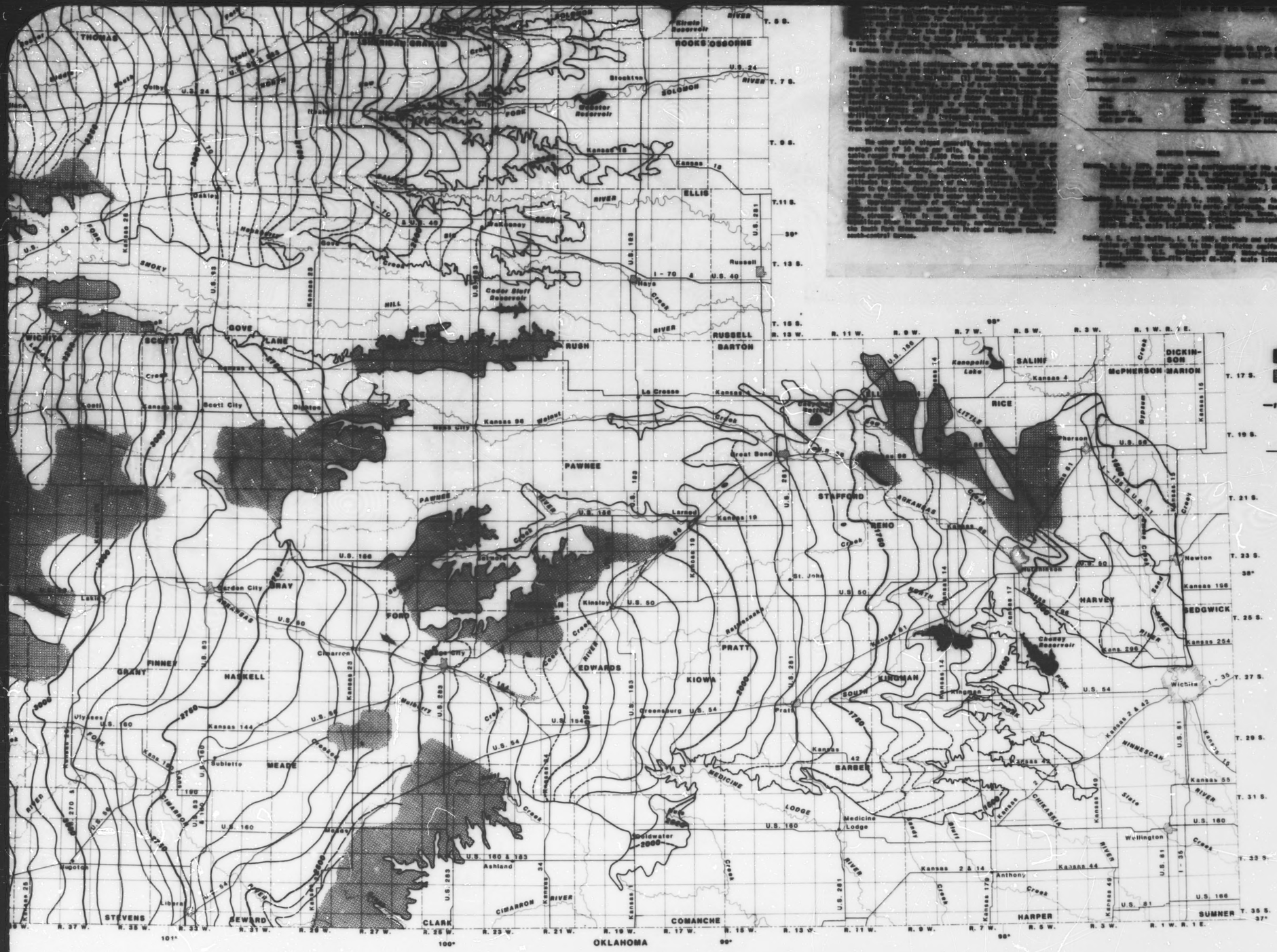

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